VD2000 SERIES TEMPERATURE CONTROLLER

INSTALLATION MANUAL

TECHNICAL SPECIFICATION

Accuracy :	$^{+}/_{-}$ 0.2°C PRT, $^{+}/_{-}$ 1°C Thermocouple
Input :	Thermocouple Type J, K, R, T or PRT 100.
Output :	Relay or SSR Drive
Relay Rating :	10A @ 240V (1 x 10^7 Operations) Recommended maximum load is 1000W on Control or Alarm output)
Pulse Output Rating :	24V d.c. < 4V Off (100 mA max)
Supply Voltage :	90—264V ac 50/60 Hz
Power Usage :	Less than 3 VA
Operating Temp :	0 to +50°C

INSTALLATION

- Cut out the hole in the panel to the dimensions shown.
- Insert the controller into the panel.
- Locate the Mounting Brackets in the slots on the top and bottom sides of the case such that the screw head is pointing to the rear.
- Once located, tighten the screws to firmly locate the controller into the panel.
- DO NOT OVER TIGHTEN.
- Install the controller in a well ventilated cabinet away from direct sources of heat.

WIRING: POWER

- Connect the power to the controller by connecting the Neutral and Live leads to the appropriate terminals. Use an in-line quick blow fuse of rating 500mA in the Live connection.

WIRING: THERMOCOUPLE SENSOR

- Always use the correct compensating cable to connect the sensor to the controller.
- Always route low voltage sensor cables away from high voltage power cables.
- Ensure that any connections are clean and tight.
- When using shielded cables, ensure that the cable is grounded at one end only.

WIRING: RESISTANCE THERMOMETER SENSOR

- Ensure that any connections are clean and tight.
- Always route low voltage sensor cables away from high voltage power cables.
- When using shielded cables, ensure that the cable is grounded at one end only.

WIRING: OUTPUT CONTROL : RELAY

- The output relay has a maximum output rating of 10 Amps at 240V ac. This is equivalent to 2500W. However, it is recommended that a rating of 4 Amps (1000W) is not exceeded when connected to an element heater or other inductive (wound) load.
- It is recommended that a suitably rated in-line quick blow fuse is wired between the output of the relay and the load.

WIRING: OUTPUT CONTROL : SSR DRIVE (PULSE)

- The rating of this type of output is : 24V = ON, 0V = OFF, max 100 mA.
- No external voltage supply is required and none should be connected.

WIRING: ALARM RELAY

- The fitted relay has a maximum output rating of 10A at 240V ac. This is equivalent to 2500W. However, it is recommended that a rating of 4A (1000W) is not exceeded when connected to an inductive load e.g. element heater.
- It is recommended that a suitably rated in-line fuse is wired between the output of the relay and the alarm device.

Controller	Width (mm)	Height (mm)	Depth (mm)	Panel Cutout (mm)
VD2000	48	48	106	45.0 x 45.0 +0.5 / -0.0
VD2002	48	96	90	45.0 x 91.0 +0.5 / -0.0
VD2003	96	48	90	91.0 x 45.0 +0.5 / -0.0
VD2004	96	96	90	91.0 x 91.0 +0.5 / -0.0

Controller Dimensions & Panel Cutout Size

	VD2000	VD2003/4
Live (90—264 Vac)	1	19
Neutral	2	20

	VD2000	VD2003/4
Thermocouple Positive	7	10
Thermocouple Negative	8	9

	VD2000	VD2003/4
PRT Link	9	8
PRT Link / Resistance	8	9
PRT Resistance	7	10

	VD2000	VD2003/4
O/P Relay Common	12	16
O/P Relay Normally Open	11	18
O/P Relay Normally Closed	10	17

	VD2000	VD2003/4
O/P Voltage Positive (24V)	10	17
O/P Voltage Return (0V)	11	18

	VD2000	VD2003/4
Alarm Relay Common	6	14
Alarm Relay Normally Open	5	13

BASIC OPERATION

The function of the controller is determined the by the values entered into the parameters listed below. In order to enter a value once selected, press the SEL key.

Please note that parameters marked with an '*' can be set not to appear.

Setpoint: To alter the setpoint, simply press the Up or Down key to change the value. Once the desired value has been selected, press the SEL key to enter the value into memory.

ALSP*: Alarm trigger setpoint or timer setting. For alarm modes the value can be –1000 to +1000. For timer modes, the range can be 00h00m to 99h59m.

ALHY*: Hysteresis (Dead Band) value for the alarm. Setting range from 0 to 1000. A value of 1 is recommended.

HYST*: Hysteresis (Dead Band) value for On / Off control, when selected. Setting range from 0 to 1000. A value of 1 is recommended. Note: Set parameter Pb to 0.0 in the Option menu for On / Off control.

Ct*: Cycle time of the control output. Setting range from 0 to 60 seconds. A value of 15 is recommended for relay outputs, 1 for voltage outputs. Note: This parameter will not be visible when the Pb parameter is set to 0 I.e. the controller has been configured for On / Off control.

Filt*: Software filter. Used to dampen the input signal from the sensor to reduce erratic control due to noise on the signal. Setting range from 0.0 to 100.0. A value of 5.0 is recommended.

PVoF*: Process Value offset. Used to offset the value of the Process Value. Setting range from 0 to 1000. A value of 0 is recommended.

SPoF*: Setpoint offset. Used to remove the offset error when P control mode is applied. Setting range from Auto, 0 to 1000. See section below on 'Tuning The Controller' for the correct setting of this value. The default value of this parameter is 0. Once controlling at or around setpoint, setting this value to the 'Auto' setting will automatically calculate the correct offset. Accurate control can also be achieved by following the 'Tuning The Controller' section below.

FRONT PANEL

After applying power to the unit, the display will light and show the code for the input type and display range prior to performing its control function.

KEYS

SEL: Used to select the parameter to be changed.

/\: Used to increment the value shown or to step up through a list of available options for that parameter.

\/: Used to decrement the value shown of to step down through a list of available options for that parameter.

INDICATORS

PV: LED is lit when the actual temperature (Process Value) or parameter code is displayed.

SV: LED is lit when inspecting or changing the setpoint (Setpoint Value).

OUT: LED is lit when the control output is ON, calling for power.

ALM: LED is lit when alarm output is activated.

TUNING THE CONTROLLER

Once correctly installed and wired, power up the controller and follow these steps to correctly tune the controller: -

1. Set the Setpoint to the desired value.
2. Ensure that the Ct parameter is set to 1 for a pulse output or at least 10 for a relay output, and that the SPoF parameter is set to 0.
3. Examine the measured value as the controller attempts to control the load at setpoint. If the temperature is stable, reduce the Pb value in discrete steps, say from 5 to 4. If the temperature is unstable, increase the value of Pb value in discrete steps, say from 5 to 10. Repeat this step until the measured value is as stable as possible (plus or minus a degree or two). Note that the stable temperature is likely to be below the actual setpoint.
4. Adjust the SPoF parameter by the number of degrees that the controller is holding the measured value below the Setpoint. E. g. if the measured value has settled at 198C for a setpoint of 200C, alter the SPoF to 2 degrees.
5. This should result in the stable control of the load. However, for fast responding loads where the above steps do not result in totally stable control, slowly reducing the Cycle Time (Ct) on relay output controllers parameter should increase the performance. However, it is not recommended that the value of the Ct parameter is reduced below 5 on relay output controllers.

CONFIGURATION

There are three parameter menus on all '2000' series controllers: User, Option & Calibration. Under normal circumstances, only the User parameter menu will be required. However, if it is required to alter the configuration or calibrate the unit, then it will be necessary to access the other two parameter menus.

It is recommended that access to the Option and Calibration menus be performed by qualified personnel only.

In order to do this, it is necessary to alter the parameter lock value, as follows: -

1. With the power turned off, remove the controller from its sleeve.
2. Ensure that solder link G1 is open circuit and solder link G2 is short circuit.
3. Re-insert the controller into its sleeve.
4. Press the 'SEL' and 'UP' keys at the same time and apply power to the controller.
5. The LoCK code will appear. Use the Up and Down keys to select the desired level of access, as shown in the table.
6. Press the SEL key to enter the new parameter lock value and switch off the power.

LoCK Value	Definition
0000	No parameter can be adjusted
1000	Only SP can be adjusted
1001	SP and ALSP can be adjusted
1010	SP, ALSP and SPoF can be adjusted
1100	All parameters in User level can be adjusted
1111	Option level is open to be adjusted

OPTION LEVEL

To access the OPTION level, activate the level as detailed above, power up the unit then, once powered up, press the 'SEL' key for at least 5 seconds. The available parameters and their functions are as follows: -

Pb: Proportional Band. Setting range from 0.0 to 300.0%. Default is 5.0%. Set value to 0.0% for On / Off control. Note: When Pb = 0 (On / Off Control), the Ct parameter will not be visible on the menu.

tYPE: Sensor type selection. Refer to table (see right) for the code for the available input types and range.

Unit: Unit of process value. Select from °C or °F. Default = °C.

dP: Selection of number of decimal places.

LoLt: Low limit of range. Within the range set by the input code, this parameter is used to alter the minimum value of setpoint available to the end user.

HiLt: High limit of range. Within the range set by the input code, this parameter is used to alter the maximum value of setpoint available to the end user.

AlFU: Alarm function: Refer to table (see below) for available functions.

Act: Control output action. Set to 'dir' for (direct) cooling operation or 'rEV' for (reverse) heating operation.

SCrH: High scale of current output module. See separate calibration details.

SCrL: Low scale of current output module. See separate calibration details.

rtSH: High scale of retransmission module. See separate calibration details.

rtSL: Low scale of current output module. See separate calibration details.

Type	Range Code	°C
J	J1	0—100
	J2	0—200
	J3	0—400
	J4	0—600
	J5	0—800
	J6	0—1000
K	K1	0—200
	K2	0—400
	K3	0—600
	K4	0—800
	K5	0—1000
	K6	0—1200
R	R1	0—800
	R2	0—1000
	R3	0—1200
	R4	0—1600
T	T1	-199—400
	T2	0—100
	T3	0—200
	T4	0—400
PRT100	P1	-199—400
	P2	0—100
	P3	0—200
	P4	0—400

AlFU	Alarm / Timer Function
nonE	No alarm function
Hi	Process high alarm. PV > AlSP
Lo	Process low alarm. PV < AlSP
diF.H	Deviation high alarm. PV > SV + AlSP
diF.L	Deviation low alarm. PV < SV—AlSP
tME1	When power is applied, the alarm relay is off. Once the PV reaches SV, the timer value (AlSP) starts to count down. The alarm relay turns on when the timer count is 0.0.
tME2	When power is applied, the alarm relay is on. Once the PV reaches SV, the timer value (AlSP) starts to count down. The alarm relay turns off when the timer count is 0.0